

laboratory test conditions various requirements of minimum performance that are specified in this part.

**§ 22.7 Specific requirements.**

(a) *Design.* In the determination of adequacy of design, the following points will be considered: (1) Materials used, (2) construction, (3) accuracy, (4) size and shape, (5) range of detection (or indication), (6) life of the active parts, and (7) attention required. The suitability of the materials and the construction shall be determined by preliminary inspection, by dropping tests, by laboratory and field tests in gas and air mixtures, and by the general behavior of the equipment during the investigation.

(b) *Safety against explosion hazard*—(1) *Detectors.* Detectors shall be constructed so that they will not cause external ignitions when used in gaseous mine atmospheres.

(2) *Seals or locks.* All parts through which external ignitions might result shall be covered and protected adequately. All covers shall be sealed adequately or equipped with magnetic or other equally reliable locks to prevent their being opened by unauthorized persons.

(3) *Glasses.* Glasses or glass windows shall be of good-quality glass and protected adequately against breakage. Unguarded windows may be considered adequate in this respect, provided they are of small diameter and are of reasonably thick glass.

(4) *Battery.* If the detector is equipped with a battery, it shall be of such design that it will not produce sparks that will ignite an explosive mixture of methane and air.

(5) *Detectors of the flame type.* Methane detectors of the flame type shall be subject to the requirements of the flame-lamp schedule then in force.

(c) *Safety against bodily hazard.* Bodily hazard with battery-type detectors is due chiefly to possible burning of the user by electrolyte that has spilled from the battery. MSHA, therefore, requires that:

(1) *Spilling of electrolyte.* The battery shall be so designed and constructed that when properly filled it will not spill electrolyte under actual service conditions.

(2) *Corrosion of battery container.* The material of which the container is made shall resist corrosion under conditions of use.

(d) *Performance.* In addition to the general design and safety features, MSHA considers that permissible types of methane detectors should meet certain minimum requirements with respect to their performance, as follows:

(1) *Detectors.* (i) When the detector is operated according to the manufacturer's instructions, it shall be possible to detect at least 1 percent methane in air, and increasing percentages up to 5 percent shall be shown by continuously increasing evidence.

(ii) The average number of determinations that may be made in approximately 2-percent methane mixtures without recharging a battery or replacing a chemical accessory shall not be less than 25, and the average number of such determinations that may be made without replacing any other part shall be not less than 100.

(2) *Indicating detectors.* Indicating detectors shall give indications of as low as 0.25 percent methane. Detectors having an upper scale limit of 2 percent may be approved, but it is recommended that the detector be designed to give indications of as high as 4 percent methane. The indications for these percentages shall be within the limits of error specified in the following table:

ALLOWABLE VARIATIONS IN SCALE READING  
[In percent]

Methane in mixtures	Minimum indication	Maximum indication
0.25	0.10	0.40
.50	.35	.65
1.00	.80	1.20
2.00	1.80	2.20
3.00	2.70	3.30
4.00	3.70	4.30

(i) Tests shall be made at several percentages within the range of the indicating detector and at temperatures between the limits of 50° and 70 °F. by increments of 5°. Ten determinations shall be made at each percentage. Neither the average of the 10 readings nor more than 2 readings for each percentage shall exceed the limits of error given in the table.

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(ii) The average number of determinations that may be made with an indicating detector without replacement of any part shall be not less than 30, and the average number that may be made without recharging the battery shall be not less than 15.

(iii) The scale shall not be subdivided into smaller divisions than the general accuracy of the indicating detector warrants.

(3) *Mechanical strength.* Detectors and indicating detectors shall be subjected to the following mechanical tests: Four of each of those parts or groups of assembled parts that are not normally strapped to the user shall be dropped 20 times on a wood floor from a height of 3 feet. Parts that are strapped to the user may be subjected to a jarring or bumping test to demonstrate adequate strength. The average number of times that any one of the detectors can be dropped before breakage or material distortion of essential parts shall be not less than 10.

(e) *Attachments for illumination.* If detectors are provided with attachments for illuminating purposes, such attachments shall be subject to the same requirements as those applying to that type of lamp under the lamp schedule then in force.

## § 22.8 Material required for MSHA records.

In order that MSHA may know exactly what it has tested and approved, it keeps detailed records covering each investigation. These records include drawings and actual equipment as follows:

(a) *Drawings.* The original drawings submitted with the application for the tests and the final drawings which the manufacturer must submit to MSHA before the approval is granted to show the details of the detector as approved, are retained. These drawings are used to identify the detector in the approval and as a means of checking the future commercial product of the manufacturer.

(b) *Actual equipment.* If MSHA so desires, parts of the detectors that are used in the tests will be retained as records of the equipment submitted. If the detector is approved, MSHA will require the manufacturer to submit one

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of his detectors, with the approval plate attached, as a record of his commercial product.

## § 22.9 How approvals are granted.

All approvals are granted by official letter from MSHA. A detector will be approved under this part only when the testing engineers have judged that it has met the requirements of the schedule and MSHA's records are complete, including drawings from the manufacturer that show the detector as it is to be commercially made. No verbal reports of the investigation will be given and no informal approvals will be granted. As soon as the manufacturer has received the formal approval, he shall be free to advertise his detector as permissible.

[Sched. 8C, Oct. 31, 1935, as amended by Supp. 1, 20 FR 2575, Apr. 19, 1955]

## § 22.10 Approval plate.

(a) *Attachment to be made by manufacturers.* (1) Manufacturers shall attach, stamp, or mold an approval plate on each permissible methane detector. The plate shall bear the emblem of the Mines Safety and Health Administration and be inscribed as follows:

Permissible Methane Detector (or Permissible Methane Indicating Detector) Approval No. \_\_\_\_\_ issued to the \_\_\_\_\_ Company.

(2) When deemed necessary, an appropriate caution statement shall be added. The size and position of the approval plate shall be satisfactory to MSHA.

(b) *Purpose of approval plate.* The approval plate is a label that identifies the device so that anyone can tell at a glance whether it is of the permissible type or not. By the plate, the manufacturer can point out that his detector complies with MSHA's requirements and that it has been approved for use in gassy mines.

(c) *Use of approval plate.* Permission to place MSHA's approval plate on his detector obligates the manufacturer to maintain the quality of his product and to see that each detector is constructed according to the drawings that have been accepted by MSHA and are in MSHA's files. Detectors exhibiting changes in design that have not been